

TU



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
 United States Patent and Trademark Office
 Address: COMMISSIONER FOR PATENTS
 P.O. Box 1450
 Alexandria, Virginia 22313-1450
 www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/602,137	06/23/2003	Qing Ma	42P9478D	1583
8791	7590	01/20/2004	EXAMINER	
BLAKELY SOKOLOFF TAYLOR & ZAFMAN 12400 WILSHIRE BOULEVARD, SEVENTH FLOOR LOS ANGELES, CA 90025			PERKINS, PAMELA E	
			ART UNIT	PAPER NUMBER
			2822	
DATE MAILED: 01/20/2004				

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/602,137

Applicant(s)

MA ET AL.

Examiner

Pamela E Perkins

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 June 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 16-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 June 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 12/08/2003. 6) ☐ Other: _____

DETAILED ACTION

This office action is in response to the filing of the application papers on 23 June 2003. Claims 16-35 are pending.

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: vent hole 100, see page 7, line 13. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

The disclosure is objected to because of the following informalities:
Page 1, line 14: change "AL or copper CU" to---Al or copper Cu---;
Page 15, line 8: change "die. corner and" to---die, corner and---.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

Art Unit: 2822

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

Claims 16, 18-20 and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Mertol et al. (6,114,761).

Mertol et al. disclose a process of fabricating a microelectronic package where a heat spreader (50) is coupled, using a heat conductive adhesive, to the backside of a die (18), wherein the heat spreader (50) including a plurality of pillars (58) that shift thermally induced stress away from the corners and edges of the die (18) (fig. 4; col. 6, lines 20-59). Mertol et al. further disclose attaching mechanical reinforcements (14) between a substrate (16) and the heat spreader (12) (fig. 1A; col. 5, lines 3-39). Mertol et al. also disclose the die (18) affixed to the substrate (16) with a plurality of solder balls (20) disposed on an active surface of the die (18) aligned with a plurality of bond pads disposed on an active surface of the substrate (16) (fig. 1A; col. 4, lines 53-65).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 17, 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mertol et al. in view of Atwood et al. (6,281,573).

Mertol et al. disclose a process of fabricating a microelectronic package where a heat spreader (50) is coupled, using a heat conductive adhesive, to the backside of a die (18), wherein the heat spreader (50) including a plurality of pillars (58) that shift thermally induced stress away from the corners and edges of the die (18) (fig. 4; col. 6, lines 20-59). Mertol et al. further disclose attaching mechanical reinforcements (14) between a substrate (16) and the heat spreader (12) (fig. 1A; col. 5, lines 3-39). Mertol et al. also disclose the die (18) affixed to the substrate (16) with a plurality of solder balls (20) disposed on an active surface of the die (18) aligned with a plurality of bond pads disposed on an active surface of the substrate (16) (fig. 1A; col. 4, lines 53-65). Mertol et al. do not disclose the heat spreader fabricated from a material having a coefficient of thermal expansion similar to that of the die.

Atwood et al. disclose a process of fabricating a microelectronic package where a heat exchanger (14) is coupled, using a heat conductive adhesive, to the backside of a chip (12). Atwood et al. further disclose the heat exchanger (14) fabricated from a

Art Unit: 2822

material having a coefficient of thermal expansion similar to that of the chip (12) (col. 9, lines 35-59).

Since Mertol et al. in view of Atwood et al. are both from the same field of endeavor, a process of fabricating a microelectronic package, the purpose disclosed by Atwood et al. would have been recognized in the pertinent art of Mertol et al. Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to modify Mertol et al. by fabricating the heat exchanger from a material having a coefficient of thermal expansion similar to that of the chip as taught by Atwood et al. to avoid stress fracture between the die and the heat spreader (col. 10, lines 1-23).

Claims 23-26, 28, 29 and 31-35 and rejected under 35 U.S.C. 103(a) as being unpatentable over Mertol et al. in view of Weber (6,157,086).

Mertol et al. disclose a process of fabricating a microelectronic package where a heat spreader (50) is coupled, using a heat conductive adhesive, to the backside of a die (18), wherein the heat spreader (50) including a plurality of pillars (58) that shift thermally induced stress away from the corners and edges of the die (18) (fig. 4; col. 6, lines 20-59). Mertol et al. further disclose attaching mechanical reinforcements (14) between a substrate (16) and the heat spreader (12) (fig. 1A; col. 5, lines 3-39). Mertol et al. also disclose the die (18) affixed to the substrate (16) with a plurality of solder balls (20) disposed on an active surface of the die (18) aligned with a plurality of bond pads disposed on an active surface of the substrate (16) (fig. 1A; col. 4, lines 53-65). Mertol et al. do not disclose a through-hole extending from one exterior surface of the substrate to another exterior surface of the substrate.

Art Unit: 2822

Weber discloses a process of fabricating a microelectronic package where a through-hole (26) extending from one exterior surface of a substrate (14) to another exterior surface of the substrate (14), wherein the through-hole (26) is configured to allow for passage of underfill material to flow around solder bumps (20) of a chip (12) which are used connect the chip (12) to the substrate (14) (col. 4, lines 3-50). Weber further discloses using the through-hole as a vent hole such that air can escape during an underfill of a flip-chip bonding to the substrate (col. 2, lines 19-53).

Since Mertol et al. in view of Weber are both from the same field of endeavor, a process of fabricating a microelectronic package, the purpose disclosed by Weber would have been recognized in the pertinent art of Mertol et al. Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to modify Mertol et al. by forming a through-hole extending from one exterior surface of the substrate to another exterior surface of the substrate as taught by Weber to eliminate air gaps which can cause disruptions in the thermal expansion and contraction of the devices during usage (col. 2, line 36-48).

Claim 30 is rejected under 35 U.S.C. 103(a) as being unpatentable over Mertol et al. in view of Weber as applied to claims 23-26, 28, 29 and 31-35 above, and further in view of Atwood et al.

Mertol et al. disclose a process of fabricating a microelectronic package where a heat spreader (50) is coupled, using a heat conductive adhesive, to the backside of a die (18), wherein the heat spreader (50) including a plurality of pillars (58) that shift thermally induced stress away from the corners and edges of the die (18) (fig. 4; col. 6,

Art Unit: 2822

lines 20-59). Mertol et al. further disclose attaching mechanical reinforcements (14) between a substrate (16) and the heat spreader (12) (fig. 1A; col. 5, lines 3-39). Mertol et al. also disclose the die (18) affixed of the substrate (16) with a plurality of solder balls (20) disposed on an active surface of the die (18) aligned with a plurality of bond pads disposed on an active surface of the substrate (16) (fig. 1A; col. 4, lines 53-65). Mertol et al. in view of Weber do not disclose the heat spreader fabricated from a material having a coefficient of thermal expansion similar to that of the die.

Atwood et al. disclose a process of fabricating a microelectronic package where a heat exchanger (14) is coupled, using a heat conductive adhesive, to the backside of a chip (12). Atwood et al. further disclose the heat exchanger (14) fabricated from a material having a coefficient of thermal expansion similar to that of the chip (12) (col. 9, lines 35-59).

Since Mertol et al. in view of Atwood et al. are both from the same field of endeavor, a process of fabricating a microelectronic package, the purpose disclosed by Atwood et al. would have been recognized in the pertinent art of Mertol et al. Therefore, it would have been obvious to one ordinary skill in the art at the time the invention was made to modify Mertol et al. by fabricating the heat exchanger from a material having a coefficient of thermal expansion similar to that of the chip as taught by Atwood et al. to avoid stress fracture between the die and the heat spreader (col. 10, lines 1-23).

Conclusion

Art Unit: 2822

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Pamela E Perkins whose telephone number is (571) 272-1840. The examiner can normally be reached on Monday thru Friday, 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Amir Zarabian can be reached on (571) 272-1852. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

PEP

A handwritten signature in black ink, appearing to be a stylized 'A' or 'K' followed by a horizontal line.